JANUS.
THE NEWSLETTER OF EWELL ASTRONOMICAL SOCIETY

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Editorial:

Welcome to the December edition of Janus which is something of a bumper issue. Comprising no less than 11 pages, there should hopefully be something in it for everyone.

After last month's absence of reports on observations (other than my own short "casual" piece), we have two observation reports this month – one each from Gary and John Murrell. Both related to Mercury's transit of the Sun on 11th November, they are gratifyingly consistent!

By coincidence, Stephen has contributed a piece on establishing an EAS Observational Records Archive – perhaps Gary and John could consider "tweaking" their reports to make them the first two contributions, with others also contributing reports?

Gary has also written a couple of other pieces, whilst John has contributed the concluding article in his series on Image metadata in astronomy, and a follow-up to his previous article on the arXiv (Archive) of astronomical papers.

As a follow-up to my "casual observing" piece last month, I have included a short item showing the benefits of a processed "RAW" image when compared to basic "JPEG". These will be well known to many, but others will hopefully find the item of interest.

Finally, Stephen has written an equipment review for a recently purchased Az-El mount.

John

skyUpdate
What's up this month?

The Solar System December

MERCURY: starts the month just about visible as a morning object, now well past greatest elongation west and returning closer to the Sun. Rising at 05:47 (UT) – 1 hour and 55 minutes before the Sun – it reaches an altitude of 10° above the south-eastern horizon before fading from view as dawn breaks around 07:10 (UT). By month's end it is not readily observable, being very close to the Sun, at a separation of only 6° from it.

VENUS: recently passed behind the Sun at superior solar conjunction. Early in the month, it is not observable, reaching its highest point in the sky during daytime and being no higher than 6° above the horizon at dusk. By the end of the month it will become visible around 16:22 (UT) as the dusk sky fades, 15° above the south-western horizon. It will then sink towards the horizon, setting 2 hours and 56 minutes after the Sun at 18:51 (UT).

MARS: is visible throughout December in the dawn sky. It begins the month rising at 04:50 (UT) – 2 hours and 52 minutes before the Sun – and reaches an altitude of 13° above the south-eastern horizon before fading from view as dawn breaks around 06:37 (UT). By the end of the month it rises at 04:45 (UT) – 3 hours and 21 minutes before the Sun – and reaches an altitude of 14° above the south-eastern horizon before fading from view as dawn breaks around 07:00n (UT).

JUPITER: will soon pass behind the Sun at solar conjunction. At the beginning of the month it is not observable, reaching its highest point in the sky during daytime and being no higher than 5° above the horizon at dusk. By month's end, although having recently passed behind the Sun, it is still not readily observable, being very close to the Sun, at a separation of only 1° from it.

SATURN: will also soon pass behind the Sun at solar conjunction. Early in the month, it will become visible around 16:40 (UT) as the dusk sky fades, 11° above the south-western horizon. It will then sink towards the horizon, setting 2 hours and 48 minutes after the Sun at 18:40 (UT). By month's end, it is not observable, reaching its highest point in the sky during daytime and being no higher than 1° above the horizon at dusk.

URANUS: recently passed opposition and, early in the month, is visible in the evening sky, from around 17:22 (UT), as the dusk sky fades, 27° above the eastern horizon. Reaching its highest point in the sky at 21:24 (UT), 50° above the southern horizon. it will continue to be observable until around 02:11 (UT), when it sinks below 21° above the western horizon. By month's end it remains visible in the evening sky, becoming accessible around 17:27 (UT), as the dusk sky fades, 43° above the south-eastern horizon. Reaching its highest point in the sky at 19:27 (UT), 50° above the southern horizon, it continues to be observable until it sinks below 21° above the western horizon at 00:13 (UT).

NEPTUNE: is an early evening object throughout the month. At the beginning of the month, it becomes accessible around 17:22 (UT) as the dusk sky fades, 30° above the southern horizon. Reaching its highest point in the sky at 18:29 (UT), 32° above the southern horizon, it will continue to be observable until around 21:15, when it sinks below 21° above the south-western horizon. By month's end, it becomes visible around 17:27 (UT) as the dusk sky fades, 31° above the southern horizon. It then sinks towards the horizon, setting at 22:07 (UT).

MOON PHASES:

New Moon	26 November
First Quarter	4 December
Full Moon	12 December
Last Quarter	19 December
New Moon	26 December

My lack of Observations – Gary Walker

Your editor noted my lack of observations for the November issue of Janus. This does not mean that I have not been observing, rather that there was nothing of particular interest going on.

The Sun has been depressingly quiet, in white light, with often as many as 25+ spotless days. Only very rarely has there been a tiny spot, and then only lasting a day or so. This is because we are deep in the Solar Minimum, where the least number of sunspots occur. Even in ha light, prominences have not been plentiful, although sometimes a group of them has persisted over several days. Plages have been very rare, but there have been a few short filaments.

I saw the variable star Mira (in Cetus), in early November, and this must be at about maximum, now. It was much brighter than its “companion” magnitude 9 star close-by, and Mira was easily visible in my 8 X 50 finderscope, too. This variable star is on a 332-day cycle, varying from about magnitude 3 at maximum, to 9, at minimum. When discovered, it was called "Mira the Wonderful", as up until that time, stars were not known to vary in brightness!

I saw the "Golden Handle" on the Moon, in October, where over a matter of a few hours, the Jura mountains ringing Mare Imbrium light up in a beautiful arc shape, jutting out beyond the terminator. When I first looked, only a few mountain tops were visible, but later on that evening, they all became lit up by the sun. This effect was even visible in binoculars. It occurs because the higher mountain tops catch the sun before it reaches the floor of the Moon. This effect is usually visible, after First Quarter.

Incidentally, the great Galileo saw this, and was able to calculate the height of the mountains.

EAS Observational Records Archive - Stephen

I am planning to establish an archive of members' observations. Many other societies have these, with records going back decades, recording the often-valuable work carried out by their members. I think it is important that we have records like this for future generations to be able to access, both for research purposes and for historical record.

I have already started collecting the trickle of observations that come my way, and these are being stored on a dedicated secure G-Drive. They are only accessible to the G-Drive account holder, although they can be shared easily by way of a G-Drive link, so if anyone was interested in accessing historical observations of a particular object, they could send a request for those data to be sent to them as a link.

No personal data about the observers will be recorded on the G-Drive, other than names, which are not regarded as sensitive information for the purposes of GDPR, but anonymised or pseudonymised records could be uploaded if anyone had any particular concerns about their privacy, as indeed do I.

I would like to encourage as many of you as possible to submit observations on a regular basis. They can be emailed to me at: ewellastro.engagement@gmail.com clearly labelled as "observation for upload". Records can be in the form of images, written narrative, electronic records (eNotes) or sketches. If you hand-write/draw your observations, you can simply scan them, or photograph them with your phone, and email them in that form.

I have included a few guidelines on observational record-keeping below, that some of you might find helpful. You don't need to comply with these to have your records uploaded, they're just offered as a pointer toward best practice. If you would like to learn more about observational record-keeping, please don't hesitate to get in touch.

As with all scientific records it is important to add credibility and scientific value to your observational records by using best practice. There are certain minimum data that should be recorded for each observation in order to make it meaningful and of value to another observer who may read your records and use them for comparison.

Date - usually recorded in ddmmyyyy format without slashes or dots.

Time - recorded in Universal Time (UT), which is actually GMT. Astronomers all around the World use GMT as the standard, so that there are no time zone discrepancies.

Location - best recorded as your Longitude and Latitude. Your mobile phone will be able to provide these.

Object - what it is that you are observing.

Telescope - the type, focal length and aperture (e.g. 127/1500mm Maksutov)

Magnification - calculated by dividing the telescope focal length by the eyepiece focal length.

Seeing Conditions - using the Antoniadi Scale to be found at: https://en.wikipedia.org/wiki/Antoniadi_scale

Transparency - there are a number of different scales for this, but read this research paper for an idea of a more objective method: https://ryebrookspace.weebly.com/uploads/5/0/0/0/50005359/transparency_scale_project.pdf

Findings - a record of what is observed, but it is just as important to record what is not observed; e.g. "The Great Red Spot is not seen" or "No features consistent with active regions are demonstrated".

You will notice that findings are recorded in the present tense, which is correct practice, because they should be reported at the time of the observation, rather than in retrospect. This will lead to phrases such as "is seen"; "are noted"; "are not demonstrated" etc.

Where observations are recorded retrospectively, perhaps the following day, the narrative should begin with the statement "Written retrospectively" to make it clear that this record is being made from memory. This may also apply to comments or amendments to observations that are added after a period of reflection or further research.

Comparisons with previous observations should be made wherever possible and appropriate, leading to statements such as "Comparison is made with the observation of 21072019.", and this in turn may lead to note being made of a change in the object since that time. This is referred to as “an interval change”. With very dynamic objects such as the Sun, or Lunar surface features viewed under changing angles of illumination, interval changes may happen within very short timescales.

Images - sketches or photographs/videos count as images. It is often said that “a picture saves a thousand words”, and this has led many amateur astronomers to believe that a photograph is an observational record in itself. However, this is like saying that a chest X-ray image is all a doctor needs to make a diagnosis, when in fact, most doctors are not experts on radiological diagnosis or interpretation. For this reason, a radiologist, who is an expert in interpreting X-ray images, writes a report of their findings from the image, and it is the report that goes to the doctor who is treating the patient, not the image itself. Hence, a photograph of an astronomical object, however good, is not a complete observational record. In order to make it complete, it will be necessary to analyse and report on the image and present this analysis as a series of observations in narrative form.

When carrying out this reporting process, the aim should be to describe what is seen in the image in such a way as to make the image itself superfluous. The description should be written in a language that will enable the reader to imagine the image from the description, without ever actually seeing the image itself. This is an acquired skill and leads to the development of an unambiguous descriptive vocabulary and a series of stock phrases.

Below is an example of a report on a full-disk Hydrogen-alpha solar image:

Comparison is made with the image from ddmmyyyy. Interval changes are noted:
Prominences: small prominences are seen at the NW and SW limb. A series of large arch-shaped prominences, extending to ~ 70K Km in altitude are seen at the NE limb.
Filaments: a long (~250K Km) crescentic region of opacity is seen extending across the NH, oriented ~NE/SW; that is consistent with a filament. Two short strands of opaque material are noted in the SEQ, that are in keeping with fragments of filamental material.
AR: a group of several bright patches of increased signal intensity is seen in the NEQ, at a para equatorial latitude, and in parameridional position. The E margin of this group demonstrates some signal hyperintensity that is consistent with flaring. These features are entirely in keeping with active region plages, and surrounding chromospheric network disruption of indeterminate orientation is demonstrated. No sunspots are demonstrated. No other features consistent with active regions are demonstrated.
The disk is otherwise unremarkable.
The image is in keeping with low general levels of solar activity.

Image metadata in astronomy part 4: Wrapping up the loose ends – John Murrell

At the end of part 3 I left you with the question “what is the black stellar looking object in the bottom right of the image?” Apologies if you have emailed me with an answer and not had a reply, but my email server is broken and is losing messages. So, what is it? The background colour image used consists of 2 images taken using Red & Blue photographic plates taken at different times which have since been digitised by the Digital Sky Survey (DSS). As the object is black it must have been in the same position when both images were taken so we can eliminate things like asteroids, minor planets or satellites. The likelihood is that it is an unidentified (at least in the Simbad Catalogue) planetary nebula. More work needs to be done to confirm this.

To conclude this brief introduction to the uses of metadata in astronomical images there are a couple of things I ought to cover.

The first is the problem of adding metadata to your own images. If you take images of the sky using a telescope fitted with a digital camera you will end up with an image file with metadata about the exposure, but it will not include the position & orientation of the image on the sky. To do this you need to “plate solve” the image which involves identifying stars in the image, and telling the plate solving software what they are and where in the image they are located. This can be a challenge, particularly if you have an image of a small area and you may not be able to identify any of the stars. However, the internet and, in particular, Astrometry.net provide an online service where you can submit your images and if all goes well it will return a FITs image file with the correct WCS coordinates in the metadata. You can then open this in a viewer such as Aladin and overlay the Simbad catalogue to identify the object shown. The "use" tab on the Astrometry.net home page gives three ways of using the system, either via the web interface, via flickr, or by downloading the programme to your own computer. The system is surprisingly powerful; I have used it to reproduce the relocation of the star Feige 85. A thumbnail finder image of this was published in the Astrophysical Journal in 1958, together with its position, but when other observers tried to find the star it was not at the printed position. It proved possible to locate the correct position by submitting a cleaned-up copy of the printed image to Astrometry.net which revealed that the given position was wrong by 1 arc minute in RA, possibly an undetected typesetting error. The original article on this on the internet has been deleted, but if you want to know more contact me on: EAS2020@JohnMurrell.org.uk, hopefully my email problems will be fixed by then.

Finally, in this article I have concentrated on metadata in FITs format images, but it is also possible to include the WCS data in images in other formats. In the May 2019 edition of Janus I described how I opened the "image" of the black hole in M87 in Aladin to draw some contours on it to see if it aligned with the galactic scale radio & optical jet. The image is only available on the ESO web site as a JPEG image, and I was surprised when it opened in the correct location and orientation relative to M87. When I first opened the file it turned out the scale was wrong, but they corrected that after I informed them and the version on the ESO website (https://www.eso.org/public/news/eso1907/) should now be OK.

A bit of investigation on the web showed that a standard for the inclusion of WCS data in astronomical images was developed around 2008 known as "Astronomy Visualisation Metadata". This was developed to allow images in formats such as JPEG, GIF, PNG & TIFF to be shown in context on the sky, and to allow objects to be identified by software such as Aladin & Simbad. An introduction to AVM can be found at https://en.wikipedia.org/wiki/Astronomy_Visualization_Metadata and the rationale behind the work at: https://www.eso.org/public/announcements/ann12018/. Most "public" images from ESO, including those from the Hubble Space Telescope, now have WCS data in AVM format so you can open them in Aladin or other viewers that understand AVM and then underlay a wider image so you can see the context and identify the objects using Simbad.

From the arXiv (Archive) – November 2019 – John Murrell

In the November edition of Janus, I wrote about the archive server arXiv.org which contains open access e-prints on a range of subjects including Astrophysics. This month I thought I would introduce a couple of recent papers that are interesting and written at a level that does not require a deep understanding.

The first is "Twelve Years of Galaxy Zoo" by Karen Masters. Some of you may have taken part as "citizen scientists" in classifying galaxies online in Galaxy Zoo. This was the first project in what became The Zooniverse and 12 years later people are still classifying galaxies though what they have been asked to do uses different data sets and asks more complicated questions. The paper is at https://arxiv.org/abs/1910.08177 and concentrates on how the uses of the Citizen Science classifications have enabled new discoveries in Galaxy evolution.

The second e-print "The Vanishing & Appearing Sources during a Century of Observations project (VASCO)" by Villarroel et al is at https://arxiv.org/pdf/1911.05068.pdf This paper examines how to compare historic observations in plates and catalogues with contemporary observations to detect sources that have appeared or disappeared over a timescale of around 70 years. As a large proportion of the data is online this could make an interesting project for aspiring astronomers though, as usual, the difficulty will be getting deep observations to confirm that the object has in fact disappeared.

Unfortunately, 70 years is not long enough to determine if one of the Pleiades has in fact faded to account for the fact that most people seem to see 6 or 12+ stars. Very few, if any, seem to see 7 sisters, despite the name. Have you found an interesting paper on arXiv? If so, send the editor a brief synopsis so it can be shared with other members.

The Media on Astronomy – Gary Walker

I have commented before in Janus about how the media frequently gets it wrong when discussing astronomical topics.

Recently, however, I was gratified in seeing an episode of "Eastenders" (of all things!) actually giving correct and accurate information. It concerned the young girl, Bailey, who is very interested in Astronomy. Her Mum had just died, when her step-mum sat down with her and announced that she had bought her a star. My heart was already sinking, as I could see this coming. However, Bailey then said to her foster mum that you can't buy a star and explained why. This is really good, as in other soaps (including Eastenders!), people have bought stars for others, which could encourage others to think that this is a good idea.

Some companies sell stars to people, but this is really a con, as one cannot buy a star and name it anything you like; only the International Astronomical Union can do that. It is particularly odious when some people will want to buy a star for a deceased person. In reality, it is just an easy way to waste your money!

Reporting of astronomical events doesn't get any better. I only saw 3 of the national newspapers reporting the Transit of Mercury (including, surprisingly, the Sun!). I also saw a report on the 10pm ITV News - needless to say, it was the final item!

Images of the Southern Night Sky – John Davey

Whilst on holiday in New Zealand earlier this year, I attempted to photograph a stunning night sky observed at a place called Hahei, a village on the Coromandel Peninsula located on North Island (latitude 36.8401° S, 175.8030° E).

In-camera processed JPEG

The photograph was taken at 21:28 local time on 27 Feb 2019 using a Nikon D7200 with Sigma 10-20mm f3.5 lens set at 10mm focal length. This camera has an APS-C sensor with a crop factor of 1.5 which means that the focal length of 10mm is equivalent to 15mm on a 35mm camera. The exposure was 30 sec @ f3.5, ISO 1600, calculated using the so called "500" rule. Using this rule, 500 is divided by the 35mm equivalent focal length of 15mm to give an exposure duration of 33.3 sec as the maximum possible to avoid blurring of the stars due to their motion.

Minimally processed RAW image

I had no tripod (my wife said it was too large to carry around on a 4 week holiday), so placed the camera on its back on the roof of the car and fired the shutter remotely, relying on trial-and-error plus the wide field-of-view of the lens to capture a decent image.

I have reproduced 3 versions of the best image I obtained in order to illustrate the benefits of shooting images in RAW format, rather than relying on the JPEG format produced directly by in-camera processing.

The first image is the "straight from the camera" JPEG which shows a large number of stars, but very little else. The second and third images were produced by taking the RAW image and processing it using Photoshop. These images reveal far more of the Milky Way which was what was so stunning. The key point is that a RAW image contains useable hidden data

Enhanced processed RAW image

Observations of the Transit of Mercury 11th November 2019 – John Murrell

Observing this transit was going to be a challenge due both to the low height of the Sun and the probability of clouds. Prior to the transit I carried out a survey of my garden to see which areas were in sunlight during the afternoon. That soon convinced me that I would have to move to different positions as the afternoon progressed moving from the back to the front garden to see the later stages before the Sun set behind the houses to the west of me. The requirement to move positions meant that using my telescope would be difficult as it is not only heavy when mounted on the tripod, but there is also the need to move the battery pack that powers the mount and then realign it in the new position. As a result, I decided the best option was to use my camera with the longest zoom lens I have, fitted with a solar filter.

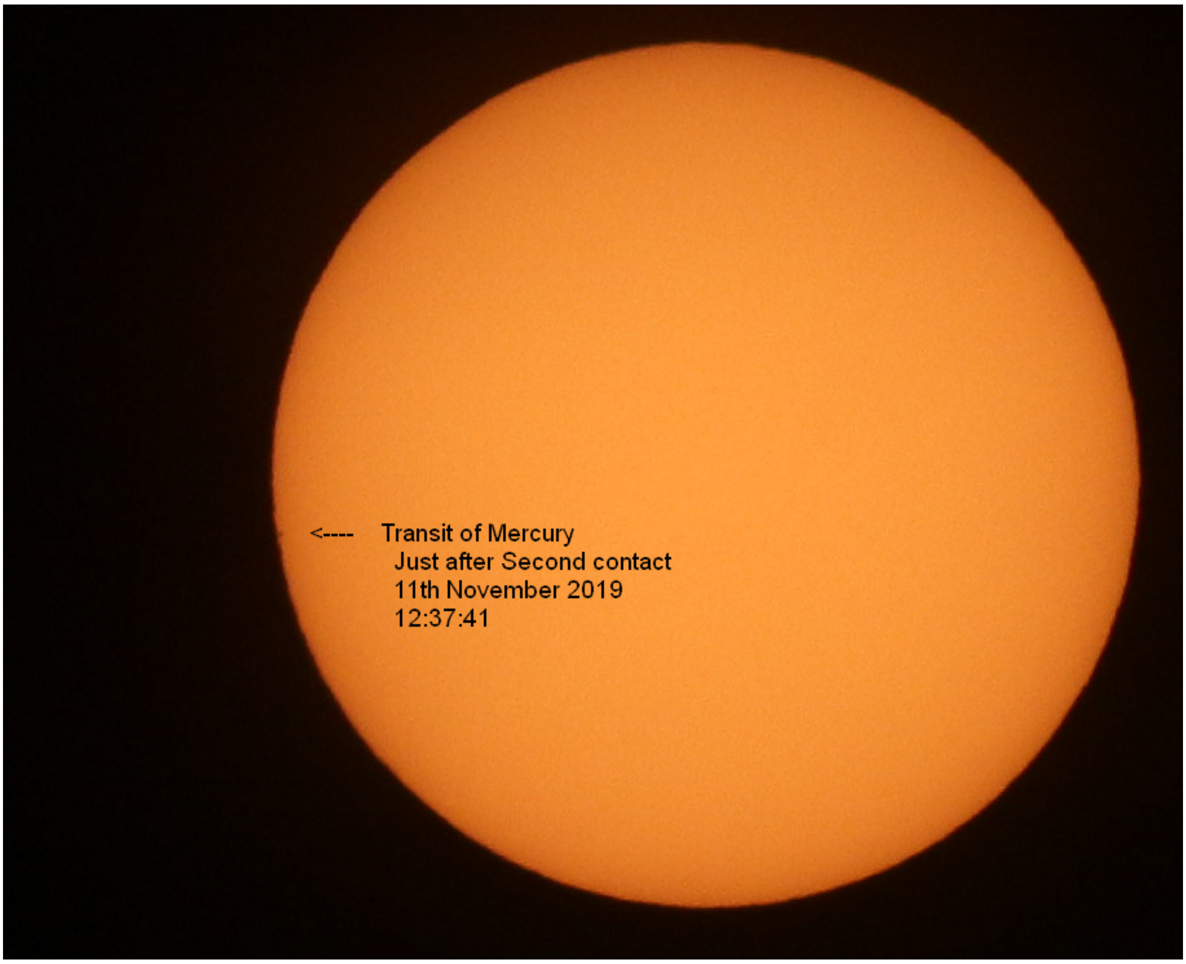
The lens has a focal length of 300 mm, so the Sun was relatively small in the image. This made it easier to find the Sun in the gaps between the clouds but made focusing quite difficult. I ended up trying both automatic and manual focusing. Neither was totally satisfactory. The auto focus struggled, particularly when the fast-moving clouds crossed the Sun while attempting to focus. With manual focusing, the problem was that I needed to magnify the live view to see if the image was in focus - but touching the lens to focus it moved the image to such an extent it was difficult to see when the optimum focus was reached.

As you will probably be aware there were broken clouds all afternoon, so the images I took were taken in the gaps. The atmosphere was not particularly steady - possibly due to my imaging across the hot roofs of nearby houses - but was still better than the conditions I had during the 2003 transit. Have a look at:
http://www.johnmurrell.org.uk/Transit%20of%20Mercury%20Turbulence%20V2/index.html to see just how poor the seeing was during part of that transit.

Despite the problems I managed to get some images. The first is just after 2nd contact, with Mercury just on the Sun's disc, at 12:37:41. The second was the last I got before the clouds arrived and the Sun set below the roof of my neighbour's house at 13:40:04.

I used a Canon 70D DSLR with a 300 mm zoom lens and Thousand Oaks Polymer Solar filter mounded on a heavy-duty tripod. The images have been enlarged due to their small size on the originals.

I am glad that I saw the transit as I have now seen and imaged 3 Transits of Mercury and 2 Transits of Venus.



Completion of a "Hat-trick" - Transit of Mercury – Gary Walker

This year, I feel I've scored a hat-trick, as I've managed to see ALL three important astronomical events – i.e. the two lunar eclipses in January and July, and the Mercury Transit in November.

Initially, I had few (if any) hopes of seeing the transit, being as it was in November, when the weather is traditionally awful. I kept trying to check the TV weather forecasts, but their predictions were both vague and basic. Thankfully, however, the weather for the transit started off fine and clear. Inevitably, the cloud increased later, but it stayed clear enough to see much of the Transit - it was one of Ron Johnson's "Clear/cloudy" days!

The transit began at 12:35 UT, with mid transit at 15:19, and ended at 18:04, although in London the sun set around 16:15 - long before the end of the transit.

I first saw Mercury half on the limb of the Sun at 12:37. I watched as it gradually trundled its way across the sun until, by 13:40, it was nearly one quarter of the way across the sun. [Editor's Note: these timings match those in John Murrell's images above].

Mercury should appear as a black disk, as it is situated against the bright face of the sun. However, I could see a ring or "aureole" surrounding a tiny black spot in the centre of it. This was especially noticeable at higher powers, e.g. 100X, 166X, and 222X.

I have always seen strange optical effects with transits of both Mercury and Venus including, sometimes seeing the black disk of the planet, with "spots" within it. None of these effects are genuine, they are just caused by contrast effects between the brilliance of the sun, and the tiny black disk of the transiting planet. Earlier astronomers remarked upon them!

Mercury was only 10' arcseconds in size so, naturally, it never appeared that large. In fact, it is at nearly the maximum angular size that Mercury CAN attain - only in May transits does it get up to 12' arcseconds.

I did not, of course, see any reduction in the light from the sun, due to Mercury blocking it out. Nevertheless, many exoplanets have been discovered in this way by being caught transiting their parent stars, as professional instruments can detect even such a small drop in light levels.

Between 12:37, and about 14:00, I saw the transit quite well, although there were some cumulus cloud “streaks” intermittently crossing the sun. After 14:00, the clouds flattened out more into stratocumulus, with only a few breaks. I then saw the sun intermittently - e.g. at around 14:.21, 14:30, 14: 48 - before I had my last sighting of Mercury at 14:57. Thus, I managed to observe this transit for about 2 hours, 20 minutes. By that time, Mercury was nearly half-way across the sun, nearing its centre. After 15:00, the Sun was mostly behind clouds with only occasional glimpses of it via cracks in the cloud.

Clearly this observation can be counted as a resounding success, as so many events are just totally blotted out by clouds.

This is the third Mercury Transit that I've seen, the other two being in 2003 and 2016. I also saw the two Venus transits in 2004 and 2012! So, I've now witnessed a total of 5 transits. Unfortunately, the next transit of Mercury is not until 2032 (another 13 years), whilst the next Venus transit is almost 100 years away in 2117!

Equipment Review - Stephen

SkyWatcher Az Pronto Alt-Azimuth Mount & Tripod

Specifications:
Helical Worm Gear Drive: AZ Axis 180 Teeth, ALT Axis 116 Teeth
Mount Rotation Angle (Continuous): 360° (Azimuth), -70° to + 90° (Altitude)
Payload Capacity: 3kg
45mm Sky-Watcher/Vixen Dovetail Saddle
2 x Flexible Slow-Motion Axis Drive Cables
21.5cm Extension Tube
3/8" Threaded Connections
Extendable Aluminium Tripod with Accessory Tray
Height of Tripod/Mount (excl. OTA): 78.5cm - 150cm
Total Overall Weight: 3.85kg

Price: £126

https://www.harrisontelescopes.co.uk/acatalog/skywatcher-az-pronto-mount.html#SID=568

I purchased my SkyWatcher Az Pronto mount for grab-and-go use in the field. I wanted a mount that was light-weight, quick to set up and take down, and that would pack up small enough to take away on holiday if I wanted to. I got exactly what I was after!

It is important to be clear from the outset, that this is a light-weight mount, designed for a small telescope. I use it with my 90mm Maksutov and - with a heavy eyepiece - this is close to the maximum practical payload for this mount. I expect it would cope with a 102mm Maksutov or a short focal length refractor up to 102mm. Indeed, I have even tried my 100/900mm ED Apo Refractor on it, and found that it was just about usable, if a little wobbly. But just because you can, it doesn't necessarily mean you should - that is not what this mount was designed for!

The mount arrived in the usual Russian Doll arrangement of cardboard boxes and was quick and simple to assemble without needing to refer to the instructions. There is an extension tube that can be fitted to increase the height of the mount, but I find that with the Maksutov, I can just about reach the eyepiece when the telescope is pointing near the horizon, and it is at a comfortable height when pointing near to Zenith, so I went for the shorter configuration, which also makes it more compact for transportation. Taller observers than I may prefer to use the extension (see image).

The mount and tripod are in the standard SkyWatcher black and white colour scheme, and the build quality is of the high standard that we have come to expect of this manufacturer. The mount head is removable, which further reduces the length for transportation. The tripod legs extend in the same way as a camera tripod, with a twist-lock mechanism, which I have to say is a lot easier to use than the more traditional screw lock design found on most astronomical tripods, that seems to require about three hands to operate. The legs terminate in rubberised feet that prevent slipping and help cushion vibration.

The only slightly disappointing aspect of the design is the use of plastic in the leg spacer bars, which strikes me as being potentially rather fragile, and once broken would be irreparable. An accessory tray twists onto the central hub of the spacer, helping to bring additional stability to the whole tripod.

The mount head is fitted with a standard SkyWatcher dovetail plate, and two manual slow-motion control cables. These are essential when using a manual mount for astronomy. Their movement was smooth and accurate. Two clutches are also provided, one for each axis, so that the telescope can be quickly pointed to any part of the sky, before locking the position and continuing to track the object with the slow-motion controls.

The slow-motion mechanisms work infinitely, which is a vast improvement on the older style mounts that had short screw threads, meaning lots of tiresome breaks in observing while the thread was wound all the way back when it reached its end stop. With this mount you can just go on tracking the object all night without stopping.

In summary then, if you have a small portable telescope that you take out and about, or away on holiday with you, and you need quick set-up and take-down times as well as portability, but can manage without GoTo or tracking, then this is probably the mount for you. It is affordable and of high quality and has, at last, filled the yawning gap in the market for an effective manual altazimuth mount. Just to be clear though - because it's not obvious from the technical specifications - you can't use this as a camera tripod, unless you have found a way to attach a dovetail bar to your camera.

Up Next:

NEXT MEETING: Friday 13 December 2019 Nonsuch High School for Girls Library 8pm.

This is the Society's AGM, and there will be a quiz.

Ron Canham will also give his usual presentation on the sky at night for the coming month.

NEXT VIEWING GROUP: Wednesday 4 December 2019 Nonsuch High School for Girls 8pm.

These are informal sessions for members to meet and discuss anything related to their telescopes and sky events and, if weather permits, to go up on the roof for observing.

NEXT DENBIES OBSERVING SESSION:

Please watch our social media and email alerts for updates.

AD HOC OBSERVING AT WARREN FARM:

These will be at short notice when the weather is favourable. Please watch our Whats App feed for alerts.